

12.

Eastern Pacific Expeditions of the New York
Zoological Society. XIX.
Actiniaria from the Gulf of California.¹

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(Text-figures 1-8).

[This is the nineteenth of a series of papers dealing with the collections of the Eastern Pacific Expeditions of the New York Zoological Society made under the direction of William Beebe. The present paper is concerned with specimens taken on the Templeton Crocker Expedition (1936). For data on localities, dates, dredges, etc., refer to *Zoologica*, Vol. XXII, No. 2, pp. 33-46.]

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INTRODUCTION.

The Actiniaria from the Templeton Crocker Expedition to Lower Californian waters contained four species, of which three apparently are new to science. Of especial interest is *Nemanthus californicus*, nearly related to *Nemanthus* (*Sagartia*) *nitidus* (Wassil.) from the waters of Japan, both belonging to a new genus and a new family characterized by having curious, acontia-like formations without any nematocysts at the termination of the filaments.

Family Aliciidae.

Alicia beebei, sp. nov.

Diagnosis: Pedal disc, wide, thin, with fairly distinct insertions of the mesenteries. Column in its uppermost part smooth, forming a capitulum,

¹ Contribution No. 598, Department of Tropical Research, New York Zoological Society.

lower parts provided with sessile vesicles crowded at the base, upwards more scattered; at the border to the capitulum the vesicles are pedunculate, each peduncle bearing 2-7 vesicles. Tentacles long and slender, about 96. Mesenteries 96 pairs of perfect mesenteries. Nematocysts of the lower part of the column 12-14 x 2 μ ; those of the vesicles partly 59-72 x about 12 μ , common, macrobasic amastigophors, partly 60-77 x 6-8.5 μ , very numerous, microbasic amastigophors; those of the capitulum 12-17 x (almost) 2-2 μ , common; those of the tentacles partly 43-51 x 5-5, 5 μ common, microbasic amastigophors, partly 13-18 x (about) 2 μ , common; those of the actinopharynx (26)36-41 (46) x 4, 5-5 μ , common, microbasic amastigophors, those of the filaments partly 24-29 x over 4 μ , microbasic amastigophors, partly 7.5-10 x about 2, 5 μ , microbasic p - (penicilli-like) mastigophors; the small nematocysts of the column and tentacles probably basitrichs. Spirocysts of the capitulum up to 36 x 6 μ ; those of the tentacles 17 x 2, 5- (about) 41 x 6 μ .

Color in Alcohol: Basal parts of the tentacles yellowish-brown.

Size: Height 2.5 cm., breadth of pedal disc 2 cm., of the oral disc 1.5 cm.; length of the tentacles 3.5 cm., or longer.

Locality: St. 136 D-30, Arena Bank, 23° 27' N. Lat., 109° 24' W. Long., 35 fms., May 1, 1936, 1 specimen.

Family Nemanthidae fam. nov.

Acontiarina with mesogloal sphincter. No acontia proper but acontia-like organs situated at the termination of the filaments and not forming any batteries of nematocysts.

I refer the family for the present to Acontiarina, because it seems to me that it is more closely related to this subtribe than to the Mesomyaria. The diagnosis of the subtribe Acontiarina may be altered in such a way that it encloses also the family proposed above.

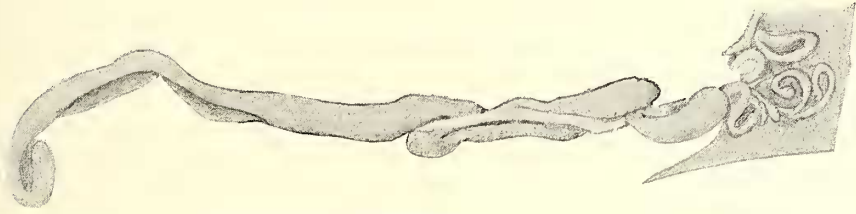
Nemanthus gen. nov.

Nemanthidae with wide pedal disc, smooth column and long tentacles, considerably fewer than the mesenteries at the base. Sphincter mesogloal, well developed. Longitudinal muscles of tentacles and radial muscles of oral disc ectodermal. Actinopharynx with distinct, fairly broad siphonoglyphs, as a rule 2, but possibly varying in connection with asexual reproduction. As a rule 2 pairs of directives; perfect mesenteries at least 6, up to 12 pairs, frequently irregularly arranged, so that one side has more mesenteries than the other, sterile; stronger imperfect mesenteries fertile. Longitudinal muscles of mesenteries not forming distinct pennons; parietobasilar muscles moderately weak or weak. Acontia-like organs, not forming any batteries of nematocysts, present at least on some of the mesenteries. Amastigophors absent in the tissues.

The type of the genus proposed above is *Sagartia nitida* Wassilieff; described from Sagami Bay on the coast of Japan. As the anatomical description given by Wassilieff (1908, p. 31) of the species in several points is imperfect, it was necessary to re-examine the species. It was so much more important as, owing to the imperfect preservation of *N. californicus* described below, I could not describe with certainty some details of its anatomy.

Before discussing the species it seems suitable to describe the curious acontia-like organs so characteristic of the genus. They occurred in all six specimens examined, (4 of *nitidus* and 2 of *californicus*) but always in

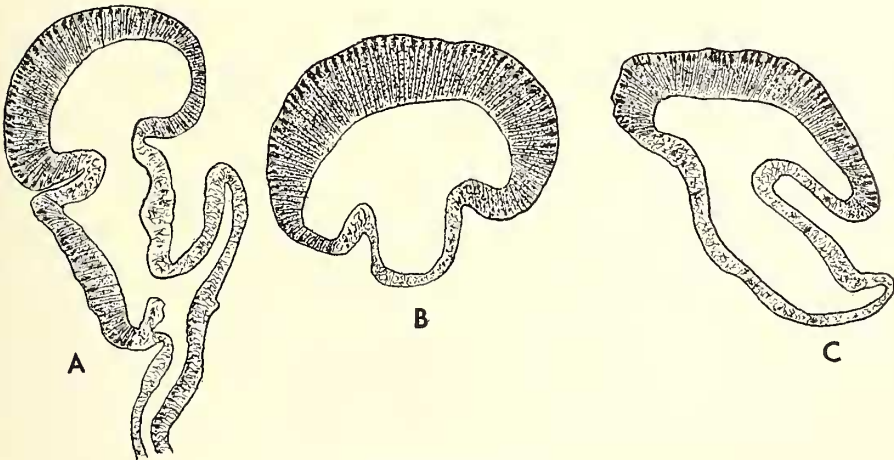
small number and only on some of the mesenteries. Like the acontia they are attached to the mesenteries at the termination of the filaments. They are either short and thick, or longer and sometimes more slender, but always many times thicker than the filaments; in the latter case they were twice found to be squeezed out through the actinopharynx through the contractions of the animals.



Text-figure 1.

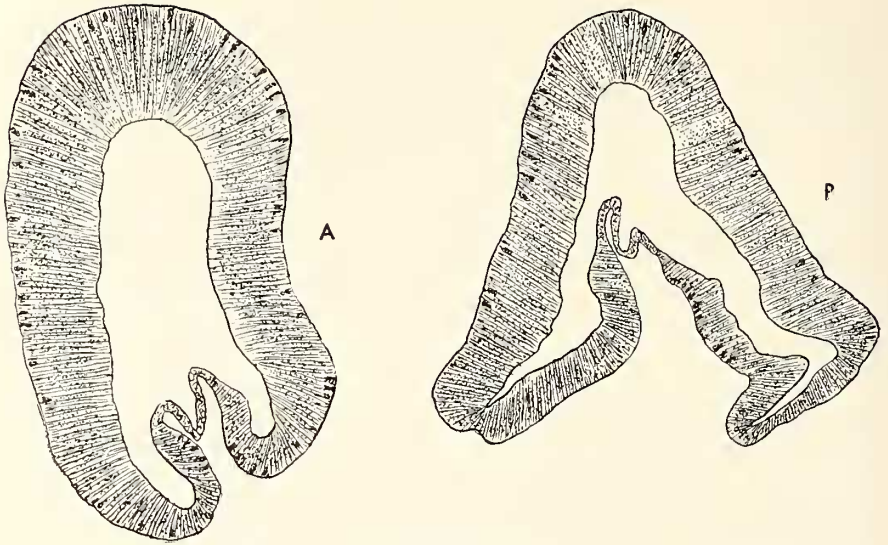
Nemanthus nitidus. Lowest part of mesentery with filaments and acontium-like thread.

Their appearance (Text-fig. 1) is in itself somewhat different from that of an acontium, so it calls for an anatomical examination. I have made slides of two threads, one from *nitidus* and one from *californicus*, and examined several in maceration preparations. Text-figure 1 shows the lowest part of a mesentery with filaments and the acontium-like thread of *nitidus*. Text-figure 2 a, b, c, shows three transverse sections of the same thread, the section on Text-fig. 2 a taken at the insertion of the thread on the mesentery, and Text-fig. 3 a, b, two similar sections of a thread of *californicus*. Thus the cross-sections are seen to recall somewhat that of an acontium. There is an axis of mesogloea, as it seems always thick and surrounded for the most part by a very thick epithelium (ectoderm) and in the part where the mesogloea runs out in a more or less fin-like outgrowth, by flattened endoderm cells. The fin varies very much, from small (Text-fig. 3 a, b) to elongated (Text-fig. 2 c). No muscles are attached to the fin in contradistinction to the conditions of the acontium. The epithelia are not provided with any nematocysts. (True, I have found a few nematocysts



Text-figure 2.

Nemanthus nitidus. Transverse sections of acontium-like thread shown in Text-figure 1.



Text-figure 3.

Nemanthus californicus. Transverse sections of an acontium-like thread.

in some of the maceration preparations, but they belonged probably to the filaments as they agreed in size as well as in types with those. If they occasionally are really present they are at least extraordinarily rare). The question is how to interpret these acontia-like organs which Wassilieff (1908, p. 34) has anticipated to be acontia. They may be degenerated acontia which have lost their nematocysts, or formations *sui generis*, or acontia which have not yet developed their nematocysts. The last supposition is not likely, as the nematocysts appear in the acontia in an early stage of their development (Carlgren, 1934). At present the question must be left unanswered. In certain respects the acontia-like organs recall the acontoids of the Ceriantharia inasmuch as the ectoderm here also consists only of supporting and gland cells.

Nemanthus nitidus (Wassilieff).

Sagartia nitida sp. nov. Wassilieff, 1908, p. 31. pl. I, figs. 18, 19; pl. VIII, figs. 84-87; text-figs. 14-17.

Diagnosis: Pedal disc wide. Column smooth with longitudinal furrows indicating the insertions of the mesenteries. Margin distinct. Sphincter strong, mesogloal, alveolar but here and there more reticular, separated from the muscles of the endoderm and from the ectoderm by a broad mesogloal lamella. Tentacles fairly numerous, up to about 130, not half the number of the mesenteries at the base, conical, the inner ones long, the outer ones considerably shorter. Longitudinal muscles of the tentacles and radial muscles of the oral disc weak. Actinopharynx smooth with indistinct longitudinal furrows and 2 (always?) fairly broad siphonoglyphs. Mesenteries variable in number, up to about 280 at the base, often asymmetrically situated. Pairs of perfect mesenteries 6-12, sterile, the stronger imperfect ones fertile. Two pairs (always?) of directives. Longitudinal muscles of mesenteries weak, forming no distinct retractors, parietobasilar muscles very weak. Acontia-like organs forming no nematocyst batteries,

present on a few mesenteries. Dioecious. According to Wassilieff reproduction by any kind of longitudinal fission. Nematocysts of the column 14-17 x 2.5 μ , basitrichs; those of the tentacles 22-31 x (about) 2.6-3 μ , numerous, probably basitrichs; those of the actinopharynx partly 15.5-24 x (about) 2.5 μ , probably basitrichs, partly 17-18 x 2.6-3 μ , microbasic p-(penicilli-like) mastigophors; those of the filaments partly about 10 x 2.5 μ , partly 13-18 x (about) 2.7-3 μ , microbasic p-mastigophors. Spirocysts of the tentacles 19 x 2.5 - 41 x 5 μ .

Color: According to Wassilieff and Gislén, rose-colored.

Localities: Japan. Sagami. Koaziro, 6 m. T. Gislén, 1930, 2 specimens; Bonin Isl. N.W. of Port Lloyd, 70 fms. S. Block, 1914, 1 specimen; 33° 15' N., 129° 15' E., 45 fms., temp. 73° F. Svenson, 1890, 1 specimen; 33° 5' N., 129° 16' E., 36 fms., temp. 51° F. Svenson, 1890, 3 specimens.

As to the perfect mesenteries, I have examined three specimens, one of which was fertile and had well developed testes in the stronger, imperfect mesenteries. The fertile individual and the single specimen from Bonin Island had 12 pairs of perfect mesenteries, two of which were directives, symmetrically arranged. Both showed the same arrangement of the perfect pairs, 4 pairs on the one side of the directive plane, 6 on the other; the third specimen had only 6 pairs of perfect mesenteries, symmetrically situated. The last specimen had 90 tentacles but about 275 mesenteries at the base, another specimen 136 tentacles and about 280 mesenteries at the pedal disc.

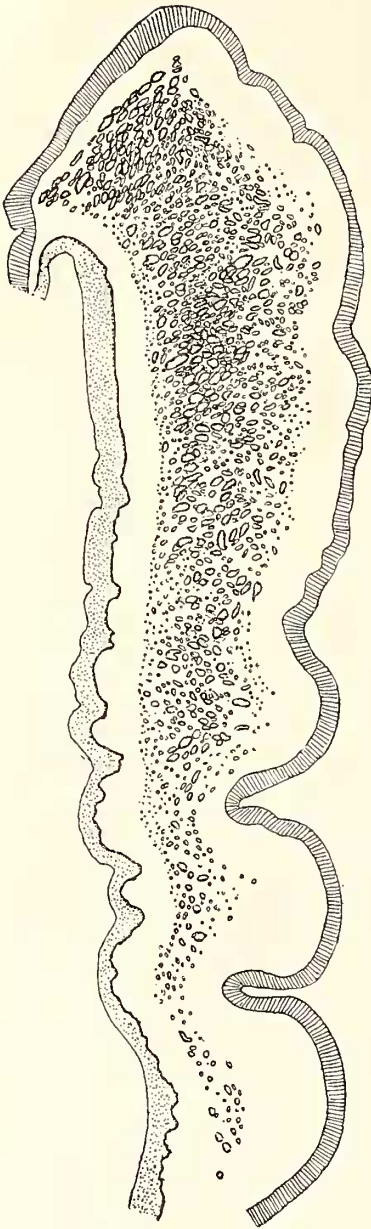
As Wassilieff's figure of the sphincter is very schematic, I give here a more detailed figure of it (Text-fig. 4).

***Nemanthus californicus* sp. nov.**

Diagnosis: Pedal disc wide. Column smooth with more or less distinct, longitudinal furrows. Sphincter strong, in its uppermost part occupying almost the whole breadth of the mesogloea and here reticular, with tendency to transverse stratification on its external side, gradually diminishing in breadth downwards, in its lower part alveolar. Tentacles in number up to about 124, long, conical, the inner ones about twice as long as the outer ones. Longitudinal muscles of tentacles ectodermal, weak; radial muscles of oral disc ectodermal, weak at the insertions of the mesenteries, thickened between them, the folds delicate but not much branched. Oral disc with deep radial furrows at the insertions of mesenteries. Actinopharynx with 2 rather deep siphonoglyphs. Mesenteries at the base up to about twice as numerous as the tentacles. Pairs of perfect mesenteries 8 or more. Two pairs (always?) of directives. Longitudinal muscles of mesenteries forming low folds and uniformly distributed over almost the whole surface of the mesenteries. Parietobasilar muscles not situated on an outgrowth of the mesogloea, reaching upward for some distance, their folds sometimes tall but delicate. Acontia-like organs and probably also reproduction as in *N. nitidus*. Dioecious. Nematocysts of the column 14-19 x 2.5 μ , basitrichs; those of the tentacles 23-29 x 2.5 (about) 3 μ , rod-like, probably basitrichs; those of the actinopharynx partly 17-24 x 2-2.5 μ rod-like, fairly common, partly 18 x 3 μ microbasic p-mastigophors, rare; those of the filaments partly 14-18 x 2.5-3.5 μ microbasic p-mastigophores, partly 8.5-12 x 1-1.5 μ probably basitrichs. Spirocysts of the tentacles 22 x (about) 2.5-43 x 5 μ .

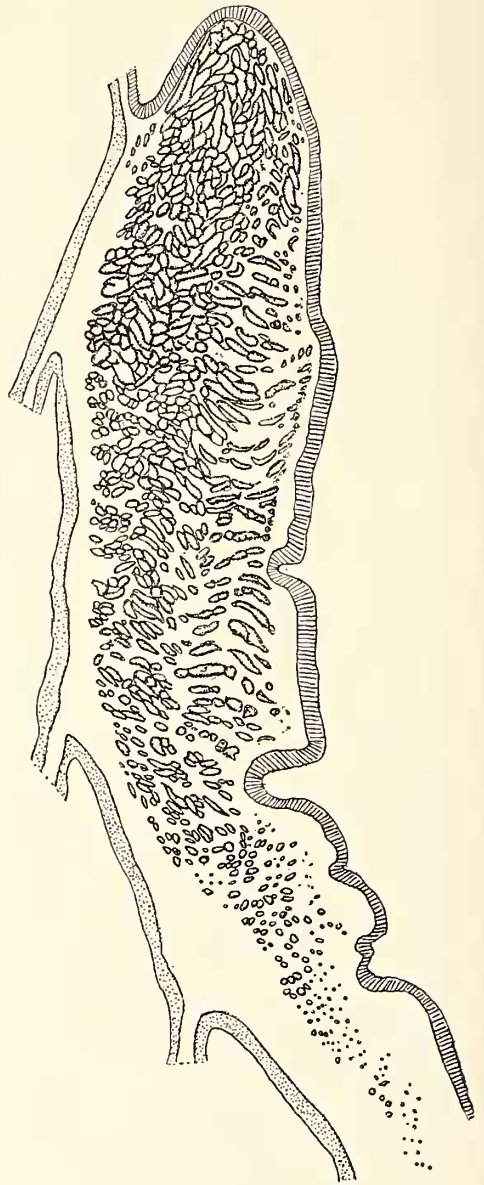
Color in Alcohol: Column with numerous, close, greenish-gray spots distributed over the whole surface.

Size: Largest specimen, average height about 1 cm., breadth about 1.5 cm., (pedal disc broader); length of the inner tentacles up to 1.5 cm., of the outer ones about 0.7 cm.



Text-figure 4.

Nemanthus nitidus. Section of sphincter.



Text-figure 5.

Nemanthus californicus. Section of sphincter.

Locality: St. 136 D-1, Arena Bank, 23° 29' N. Lat., 109° 25' W. Long., 45 fms., April 3, 1936, several specimens. (No. 36171). Some individuals were attached to the stalk of an octocoral.

Text-figure 5 shows a section of the sphincter. Two individuals examined had 8 pairs of perfect mesenteries, a third sectioned had at least 8, probably a few more. It was, however, wrinkled and not so well preserved that I was able to count their exact number. The largest example had about 124 tentacles and 196 mesenteries at the base, another had 112 tentacles and about twice as many mesenteries at the base. The perfect mesenteries were apparently sterile and the development of the generative organs is probably limited to the stronger imperfect mesenteries. A sectioned specimen was a female with numerous, small ova. As with *N. nitidus* the individuals of the present species live together in colonies, sometimes so closely packed that the borders of the pedal disc touch each other intimately. Wassilieff has described longitudinal fission in *nitidus*—perhaps it would be more adequate to speak of budding. Probably asexual reproduction occurs also in *californicus*, since I have found a small bud at the base of one specimen.

Remarks: The species is closely related to *nitidus* but the color is different, the muscles of the oral disc and the mesenteries are stronger, the sphincter stronger and more reticular in *californicus*, etc.

Family Sagartiidae.

Actinothoë californica sp. nov.

Diagnosis: Pedal disc broad, column smooth, cinclides?, margin distinct. Sphincter strong, alveolar, with tendency to be reticulated, occupying in its upper part the whole breadth of the mesogloea, diminishing downwards, and separated from the circular muscles of the column by a fairly thin lamella. Tentacles about 192. Longitudinal muscles of tentacles and radial muscles of oral disc ectodermal. Two distinct siphonoglyphs. Probably not more mesenteries than tentacles. Two pairs of directives. At least 12 pairs of perfect mesenteries. Retractors of the older mesenteries strong, fairly concentrated with tall folds. Parietobasilar muscles apparently weak. Nematocysts of the column partly 17-34 x 3.5-5.5 μ , partly 12-17 x 1.5-2 μ , basitrichs; those of the tentacles partly 21-34 x 2.5-3 μ , rod-like, partly 21-22 x (about) 4 μ , those of the actinopharynx 24-29 x (about) 2.5 μ ; those of the acontia partly 48-53 x (about) 6 μ ; microbasal amastigophors, partly 19-28 x 2-2.5 μ , basitrichs; spirocysts of the tentacles 15-29 x 2.5-4.5 μ .

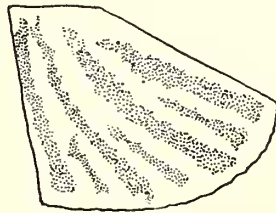
Color in Alcohol: Column with irregular red-brown spots arranged at least in its proximal part in distinct longitudinal rows about as in *A. undata* var. *anguicomma* and *lacerata*. (see Stephenson, 1935).

Size: Largest, strongly contracted example; height 1.5 cm., pedal disc 2.5 x 2 cm.

Locality: Sta. 142 D-3, Santa Inez Bay, 27° 04' N. Lat., 111° 54' W. Long., 40 fms., April 11, 1936. (No. 36,253). 2 specimens on *Murex recurvirostris*, one shell inhabited by a pagurid.

Text-figure 6.

Actinothoë californica. Lower part of column, showing arrangement of spots.



Text-figure 6 shows the arrangement of the spots in the lower part of the column, Text-fig. 7 a section of the upper half of the sphincter and Text-



Text-figure 7.
Actinothoë californica. Section of upper
half of sphincter.



Text-figure 8.
Actinothoë californica. Re-
tractor of a mesentery.

fig. 8 a retractor of a perfect mesentery. Because the pedal disc was extended over the spines of the shells and the body so strongly contracted that the summits of the contracted tentacles almost reached the pedal disc, and the preservation of the individual furthermore was not too perfect, the examination of the specimen was difficult and some observations uncertain. The examined example was a male, but the distribution of the gonads was impossible to decide. As to the broader nematocysts of the column, the shorter ones (about 17-18 μ) were certainly microbasic amastigophors—the capsules were often exploded and the “hampe” somewhat longer than the capsule; the longer ones were probably similar. (They were usually exploded but with the “hampe” torn to pieces, but as I have seen the apex of the “hampe” and it was not provided with a thread, I think that they all were amastigophors though somewhat different in their structures).

The rod-like nematocysts of the tentacles were not examined, the broader being exploded but with the “hampe” damaged, wherefore I cannot decide their category. Probably they were microbasic amastigophors.

Besides the species described above, a fourth species has been taken by the expedition on Gorda Bank, 23° 06' N. Lat. and 109° 25' W. Long., at a depth of 50 fathoms. Two small individuals, both attached to the stem of an octocoral, were present in the collection. One specimen had 72 tentacles and about 136 mesenteries at the base disc, the other about 80 tentacles and about 170 mesenteries at the base. In one individual 10 mesenteries were perfect. The sphincter was strong and mesogloal-alveolar; the longitudinal muscles of the tentacles were ectodermal. I have made maceration preparations of the tissues in order to examine the nematocysts, but, in spite of careful examination I have not found any nematocysts which could be supposed to belong to acontia. The general appearance of the animals and the characters enumerated here, apart from the absence (?) of acontia, recall those of the genus *Amphianthus*, but as the individuals also were sterile, I have preferred not to name the species.

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